

**ABSTRACT**

Sensor arrays and sensor array systems for detecting analytes in fluids. Sensors configured to generate a response upon introduction of a fluid containing one or more analytes can be located on one or more surfaces relative to one or more fluid channels in an array. Fluid channels can take the form of pores or holes in a substrate material. Fluid channels can be formed between one or more substrate plates. Sensor can be fabricated with substantially optimized sensor volumes to generate a response having a substantially maximized signal to noise ratio upon introduction of a fluid containing one or more target analytes. Methods of fabricating and using such sensor arrays and systems are also disclosed.

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